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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/750,402	12/28/2000	Richard M. Formato	47756-CIP1- DIV (70184)	7849
21874	7590	05/28/2004	EXAMINER	
EDWARDS & ANGELL, LLP			ALEJANDRO, RAYMOND	
P.O. BOX 55874			ART UNIT	
BOSTON, MA 02205			PAPER NUMBER	
			1745	

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/750,402

Applicant(s)

FORMATO ET AL.

Examiner

Raymond Alejandro

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 51-76, 118, 119 and 121-124 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 51-53, 57, 59, 60, 62, 69, 72-76, 118, 119 and 121-124 is/are rejected.
- 7) ☐ Claim(s) 54-56, 58, 61, 63-68 and 70-71 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/13/04 has been entered.

This communication is responsive to the amendment filed 05/13/04. The applicants have overcome the objection. However, the 35 USC 103 rejection is still maintained for certain claims. Thus, the claims are rejected for the reasons of record.

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 51-53, 57, 59-60, 62, 69, 72-76, 118-119 and 121-124 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al 4865930 in view of Arnold Jr et al 4714663.

The instant application is directed to a method of producing a composite solid polymer electrolyte membrane wherein the inventive concept comprises the specific materials therefor.

With respect to claims 51, 118-119:

Kindler et al disclose the following (claims 1-4):

Art Unit: 1745

40 What is claimed is:

1. A method for forming a membrane comprising gas-permeable regions and ion permeable regions, said method comprising the steps of:

- 45 (a) providing a substrate comprising a porous ion-impermeable polymer;  
(b) fully impregnating said substrate with a chosen polymeric ion-conducting material to provide a composite of regions of said ion-conducting material throughout said substrate;

- 50 (c) stretching said composite to produce pores in said substrate to provide for the passage of gas and to thereby form said membrane comprising regions of said ion-conducting material juxtaposed to said gas-permeable regions formed by said pores in said  
55 substrate.

2. The method of claim 1 wherein said substrate is selected from the group consisting of porous polytetrafluoroethylene, porous polypropylene, and porous polysulfone.

- 60 3. The method of claim 1 wherein said polymeric ion-conducting material is selected from the group consisting of a cation exchange material, an anion exchange material, and a cation and anion exchange material.

4. The method of claim 3 wherein said polymeric  
65 ion-conducting material is selected from the group consisting of a polymer of polytetrafluoroethylene with fluorinated ether side chains terminated with sulfonic acid groups, an alkali resistant copolymer of vinyl chlo-

7

ride and acrylonitrile with quaternary nitrogen groups, and polyethylene with acrylic acid radiation grafted thereon.

As for claims 52-53, 121-122:

It is further disclosed that the system is particularly useful because of its relatively low operating temperatures i.e. 250°C. Thus, it is noted that the system components are to be thermally stable at temperatures below the above one.

Regarding claims 75-76:

It is taught that alternatively, a solution of the polymer in a chosen solvent may be applied to the surface of the substrate, with subsequent removal of the solvent (col 3, lines 60-64);

Art Unit: 1745

wherein the solvent is an alcohol blend solvent (col 4, lines 65-68); wherein the membrane was placed in contact with dimethylsulfoxide (col 5, lines 4-8).

On the subject of claims 72-74:

It is disclosed that the partially wet composite is dipped into a catalyst material, which then becomes attached to the surface of the partially wet composite, upon completion of the drying process, the catalyst material is adhered to the surface of the composite (col 5, lines 60-68). It is noted that by dipping the wet composite into the catalyst material as mentioned above fractions of degraded material is removed therefrom.

Kindler et al disclose a method for forming a membrane according to the foregoing. However, Kindler et al does not expressly disclose the casting process and the specific casting/extruding sequence, and the specific substrate and ion-conducting material.

As for claims 51 and 118-119, 123:

Arnold Jr et al disclose a preparation step of a composite membrane including casting the membrane itself (Examples 1-2) wherein the membrane is an oxidative resistant, conductive, ion-selective membrane comprising a catenated aromatic polymer (claim 1); and wherein the membrane comprises a sulfonated aromatic polysulfone (claim 2).

As to claims 57, 59-60, 62:

The membrane is an oxidative resistant, conductive, ion-selective membrane comprising a catenated aromatic polymer (claim 1); and wherein the membrane comprises a sulfonated aromatic polysulfone (claim 2).

With reference to claim 69:

Art Unit: 1745

It is disclosed that the aromatic polymers are used either with or without linking groups including polyphenylene or its oxide (col 3, lines 50-54).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to cast the membrane of Kindler et al as taught by Arnold Jr et al as Arnold Jr et al teach that by casting the resin solution a releasable substrate exhibiting an improved area resistivity is obtained.

With respect to the specific casting/extruding sequence, it would have been obvious to one skilled in the art at the time the invention was made to perform the specific casting/extruding sequence to make the solid polymer of both Kindler et al and Arnold Jr et al as changes in sequence of adding ingredients has been held to render a prima facie case of obviousness, consequently, it is still contended that reversing the order of the prior art process steps (*Ex parte Rubin 128 USPQ 440*); selection of any order of performing process steps (*In re Burhans 69 USPQ 330*); or selection of any order of mixing ingredients (*In re Gibson 5USPQ 230*) are prima facie obvious in the absence of new or unexpected results (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale: IV. Changes in Sequence of Adding Ingredients).

As for the specific substrate and ion-conducting material, it would have been obvious to one skilled in the art at the time the invention was made to use the specific substrate and ion conducting material of Arnold Jr et al in the membrane of Kindler et al as Arnold Jr et al disclose that for batteries containing strong oxidizing electrolyte and a membrane separating electrolyte solutions, a membrane fabricated from an aromatic polymer and/or a sulfonated polysulfone provides an improved oxidative resistant, conductive, ion selective membrane.

Art Unit: 1745

***Allowable Subject Matter***

3. The following is a statement of reasons for the indication of allowable subject matter: it was set forth in a prior office action dated 03/27/03.
4. Claims 54-56, 58, 61, 63-68 and 70-71 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

Applicant's arguments filed 05/13/04 have been fully considered but they are not persuasive. The principal line of argument of applicants is grounded on the assertion that the prior art of record does not teach or suggest "the instant method comprises the step of preparing a mixture of the polymer substrate and the ion-conducting material; and thereafter casting or extruding the composite SPEM from the mixture prepared". However, this assertion is respectfully disagreed with because the combined prior art does teach the step of casting a composite membrane per se. Having said that, it is thus positively contended that sequence of adding ingredients to obtain the most satisfactory mixture of constituents is within the expected skill and judgment of those of ordinary skill in the art and such choice of sequence does not involve invention in making the mix of the claimed constituents to then casting or extruding it. Further, the transposition of process steps or the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function, manner and result does not patentably distinguish the process. Additionally, the performance of two steps simultaneously, which have been previously been

Art Unit: 1745

performed in sequence is obvious; also, the combination of separate process steps into a unitary process is obvious.

In this regard, it is noted that change in sequence of adding ingredients has been held to render a prima facie case of obviousness, consequently, it is still contended that reversing the order of the prior art process steps (Ex parte Rubin 128 USPQ 440); selection of any order of performing process steps (In re Burhans 69 USPQ 330); or selection of any order of mixing ingredients (In re Gibson 5 USPQ 230) are prima facie obvious in the absence of new or unexpected results (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale: IV. Changes in Sequence of Adding Ingredients).

Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro  
Examiner  
Art Unit 1745

A handwritten signature in black ink, appearing to read 'RAM', with a long diagonal stroke extending from the bottom right of the signature.